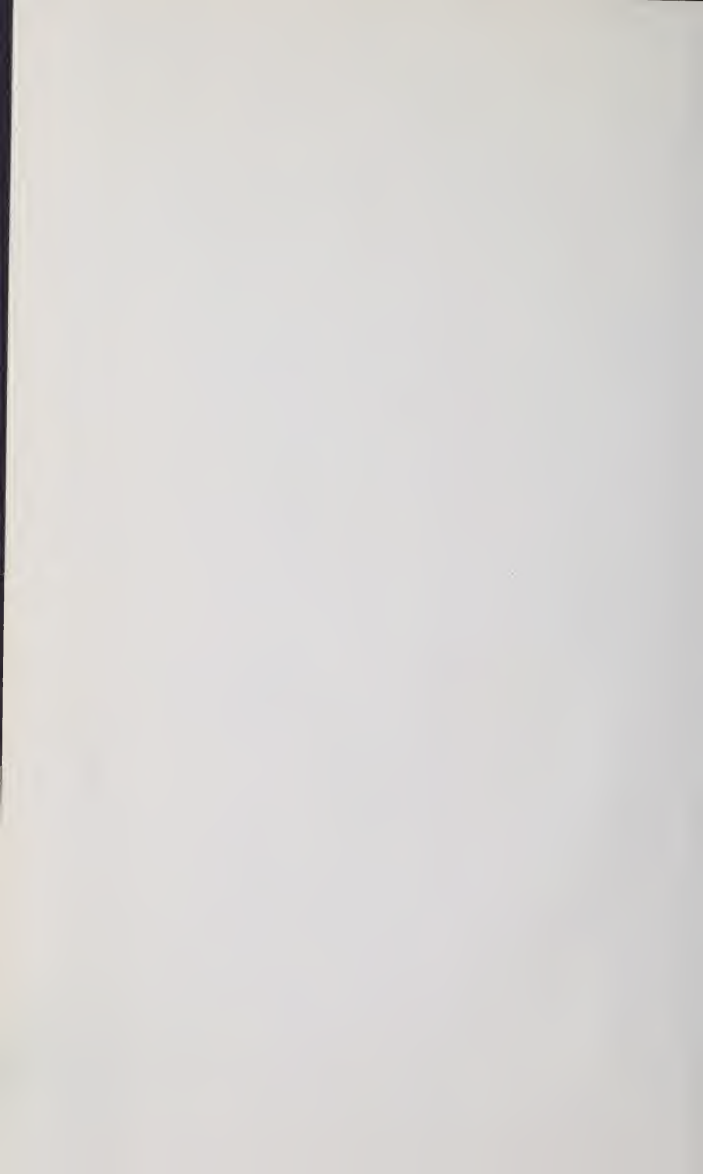




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MARYLAND AGRICULTURAL EXPERIMENT STATION

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Research Leads The Way To Agricultural Progress



52nd Annual Report
W. B. KEMP, Director

BULLETIN No. A53
UNIVERSITY OF MARYLAND

1948-1949
• COLLEGE PARK, MD.

The Sixty-Second Annual Report marks another important milestone in the long history of progress at the Maryland Agricultural Experiment Station. The primary objective of our agricultural research is to lead the way to better living and increased income not only for the farm families in Maryland but for all of society. The results of our research during the past 62 years has had an important bearing on the advancement of agriculture and the advancement of Maryland.

Researchers are constantly adding new and useful information to the stockpile of agricultural knowledge. However, the business of agriculture is a partnership business with Mother Nature and she frequently reveals her secrets with great reluctance. Therefore, progress in agricultural research is made only with great diligence and much effort. But the benefits to the people of Maryland are tremendous.

W. B. KEMP,
Director.

**To the Governor of Maryland, the Board of Regents, and
the President of the University of Maryland**

I transmit herewith the Sixty-Second Annual Report of the University of Maryland Agricultural Experiment Station, as established by Act of Congress, March 2, 1887, containing an account of research and experiments conducted during the fiscal year ending June 30, 1949, and a statement of the receipts and disbursements for the same period.

**W. B. KEMP,
Director.**

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F. S. Holmes, M.S., Chief Seed Inspector

The Station is located on the B. & O. R. R., City and Suburban Electric Car Line and the Baltimore-Washington Boulevard, eight miles North of Washington, D. C. Telephone—WARfield Exchange. Visitors will be welcome at all times and will be given every opportunity to inspect the work of the Station in all its departments.

The Bulletins and Reports of the Station will be mailed free of charge to all residents of the State who request them.

Address:

AGRICULTURAL EXPERIMENT STATION
 College Park, Maryland

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Agricultural Economics

IN STUDIES of retail merchant practices and display methods, agricultural economists have found that waste and spoilage losses of fresh produce in retail stores were lowest in the spring and highest in the winter. They found that produce moved, or turned over, more rapidly in the spring and summer than in the winter. This partially explains the heavy losses during the cold months.

Another important finding was that the largest stores had lower rates of losses. This is partly because of better care given produce.

Peas, lima beans, and snap beans were three vegetables which many produce merchandisers recommended for display on ice. However, the experiments show that it is not always profitable to use ice for these items, and that it sometimes increases spoilage.

They found that the demand for most individual commodities, in the short run, proved to be relatively elastic. Operators must keep prices for produce in line with those of competitors, or face reduced sales. While older people tended to deal with independent stores the economists found that younger shoppers purchased most of their groceries from self-service chain stores.

One important factor is that most people were more discriminating in the source of their meat purchases than in other lines of food. They were willing to travel farther for good meats. It is suggested, therefore, that meat has more influence in attracting people into retail food stores than fruits and vegetables.

Consumers were found to be exceedingly price conscious. Fifty percent of the 150 families visited said that high prices were the reason they did not trade at nearby independent stores.

Postwar Marketing

A study of problems in marketing during the postwar period has been completed this year. It shows that about 60 percent of the produce-carrying trucks visited only one wholesale area. Thirty-five percent went to two markets for produce and the remainder visited three.

The bulk of commercially produced fruits and vegetables in Maryland was marketed in five large cities. Practically all Maryland produce went to the Baltimore area by truck.

The study shows that the large number of markets in Baltimore cause much extra hauling and handling. This, together with obsolete and inefficient facilities located in areas of heavy traffic congestion results in unnecessary cost to dealers, producers and consumers.

The study shows that four of the markets could be combined in a single consolidated market. It is estimated that such a new consolidated market would require a minimum of 84 acres and the cost of buying the land, grading and constructing the market has been estimated to be about \$4,795,000. Estimates which the research workers have made of possible savings show that they would be sufficient to pay for such a market in 8 years.

The study also recommends the establishment of a non-profit corporation under State charter, to be known as the Baltimore Wholesale Market Authority. It would be charged with the responsibility for establishing the new market.

Farm Mortgages

Studies of farm mortgage trends in Maryland showed that the farm mortgage debt had increased for the second successive year, as of January 1, 1948, to \$48,781,000. This is an increase of 21.5 percent over 1946. The trend of farm mortgage debt has the tendency to follow farm real estate values although it lags a few years. Farm real estate values are closely associated with farm prices. The trends presented in this study indicate certain danger signals which should be observed by both farmers and lenders in regard to mortgage loans.

Father-Son Partnerships

Studies on father-son farm partnership arrangements have led to the statement of certain requirements for satisfactory working agreement. One of the requirements for a good farm business arrangement is a definite understanding between father and son. Good farm records must be kept. The business will have to be big enough to support the whole family. Father and son must be able to get along together. They must provide for a fair division of income. If there are two families, separate houses are best. Some of the major difficulties are insufficient income, father's lack of tolerance for son's methods, lack of separate housing, and lack of interest in farming on part of the son's wife.

Sales Taxes

Another study which is being made deals with sales taxes and their appli-

cation to farmers. One of the reasons for this study is to discover any inequalities in the tax as it affects various types of farm businesses. Should this type of inequality arise plans will be devised for straightening it out.

Farm Assessments

Techniques for assessing farm buildings are in the experimental stage. Basic information is needed to determine variation in assessments against similar farm buildings and to help develop policies and techniques which will result in more equitable farm building assessments. This study is an appraisal of the techniques used in the various counties in Maryland.

Other studies are being made on recent tax changes in Maryland and their effects on farmers' tax obligations. These scientists are investigating the general financial status of farmers and their security plans. Information gathered in these studies will help in the making of over-all agricultural programs and policies. They serve as a basis for talks on proposed governmental retirement programs.

Soil Conservation

Studies were made on the economics of soil conservation in one of the soil conservation districts. Based on 16 farms it was found that farmers with conservation plans decreased their acreage of row and drill crops more than did farmers not in the program. The annual livestock-carrying capacity was increased by 30 percent on the conservation farms and only 9 percent on the farms not in the program. Farmers expressed the opinion that by following the soil conservation program they checked erosion and by saving plant food and water yields were increased. This study indicated that mechanical control of erosion can

increase production and at the same time conserve soil and water.

Price Index

Another contribution of the Agricultural Economics and Marketing Department to all of Maryland's farmers was the price index computations. These indexes give a comparison of the prices which farmers paid for food in our state from 1910 until the present day. They serve as a basis for the parity ratio. They also serve in determining the ready purchasing power of commodities produced and sold by farmers in Maryland.

Poultry Marketing

A series of investigations were carried out in the marketing of hatching eggs and broilers on the Del-Mar-Va Peninsula. Eighty-nine percent of the broiler producers who talked to experiment station workers said that their broiler business was either first or second in importance as a source of their income. Sixty-five percent of these farmers had been in the broiler business more than 5 years. It cost these people 29.5 cents per pound to produce the birds which sold for 34 cents a pound at an average weight of 3.23 pounds. These farmers received about \$145 per 1,000 birds started above expenditures for feed, chicks, fuel and other cash costs. Feed usage and mortality were big factors in profit or loss.

The farmers also told scientists that they had a choice of selling their broilers to either independent dressing plants, cooperative dressing plants, or live buyers. Dressing plants were taking about 8 cents per pound as a margin between New York prices and dressed prices. This covered costs of processing and transportation. Any profit which resulted from the birds

came out of this 8-cent margin. Dressing plant managers who talked to the economists preferred New Hampshire birds for dressing quality.

Sweet Corn

Another study completed during the year showed that sweet corn might be tested by mechanical means for quality. Lima beans, snap beans, and tomatoes also show possibilities of field tests for objectively measuring their value. These objective measures of quality have a real application in the grading of fresh market fruits and vegetables.

Fresh Fruits

In experiments on marketing fresh fruits and vegetables in consumer packages, workers found that consumers were willing to buy prepackaged spinach and kale. Since waste and losses are reduced by prepackaging, the producer and the retail store operator may operate on a lower margin. This might reflect back to the producers in the form of higher prices and the consumer in the form of lower prices.

Other Studies

Agricultural economists are also comparing the various methods of marketing sweet corn directly from grower to consumer. When these tests are over they will be able to recommend how farmers can best market sweet corn. Other studies deal with the marketing of local produce; farm tenancy and lease arrangements in Maryland; effect of drainage upon crop yields, farming practices and land utilization; sources of supply in the major fluid milk sheds in Maryland; better distribution methods for apples and peaches; effective methods of marketing eggs of quality during the summer months.

Agricultural Engineering

THE Experiment Station's agricultural engineers have been studying grain storage on the farm. They found that changes in moisture content of grain stored in ordinary bins are very slow. They were not able to reduce the moisture content of wheat by adding certain materials which take up water since those materials already have high moisture contents in the humid climate of Maryland.

They found that natural ventilation caused by winds does not provide enough drying until fall, but it does prevent a sour odor from developing. Tests with limited forced ventilation caused a movement of moisture within the bin but very little removal of water from the bin.

A grain drier was developed which will effectively dry small grains and shelled corn. The drier is of a new principle which permits a machine so compact that a practical sized unit can be made portable.

Tobacco Tests

The agricultural engineers are making several tests on the Maryland tobacco experimental farm in Southern Maryland near Upper Marlboro. They are trying to develop more efficient methods of handling tobacco through production, harvesting, curing, and storing. Mechanical hoists for hanging tobacco in the barn are being com-

pared on a time and labor basis with hand methods.

As a part of these tobacco studies the engineers have constructed a test barn which is so designed that almost any type of hanging or housing of tobacco can take place inside. Mechanical hoisting equipment has been installed and this barn will be the scene of a series of time and labor studies.

Research workers also found that fluorescent lights with a combination of one 4500 white and one daylight bulb gave the best light for grading tobacco.

Hay Drier

In studies on drying of partially field-cured baled hay the agricultural engineers turned their efforts toward reducing costs.

The average cost per ton of hay was reduced to one-third of the previous year. Through building and mechanical equipment improvement the labor used in handling hay was greatly reduced. Spoilage in baled hay was cut almost to nothing. Partially field-cured baled hay can be dried successfully with heated air yielding a high quality, high value hay.

The Agricultural Engineers are also cooperating with the Station's Entomology Department in a project on the development of machinery for application of concentrated sprays.

Agronomy

LEGUMES

Time of Seeding

Workers carried out studies to determine the best time to seed certain legumes in wheat or barley. Monthly seedings were made beginning in October and ending in May during two years. They found in these tests that February and March were the best months to seed alfalfa, red clover, alsike and lespedeza. Also, the stands from fall seedings were found to be greatly dependent upon the amount of rainfall during the month in which they were sown. They found that among the legumes used, alsike produced less seedlings per 100 seed sown than other legumes tested. They reason that the smaller seed size of alsike gives it less food reserves and less chance of survival. The seeding rate of 10 pounds of red clover and 20 pounds of lespedeza, when sown in February or March, was found to be heavier than needed to produce good hay stands.

Keeping Red Clover Stands

Many farmers in Maryland have been reporting that their red clover stands were reduced or entirely killed during the seedling year, resulting in poor hay yields. Specialists in agronomy have observed that differences in the management of new stands can greatly affect their maintenance and vigor. Tests were conducted at 4 locations in the State to determine some ways to keep productive stands of red clover. Although much of this work is only in its second year, the agronomists feel that the following general recommendations can be made:

1. Plant locally grown red clover seed from strains that have been produced for three or more generations in the area or plant certified Cumberland or certified Kenland red clover when these seeds are available commercially and local seed cannot be obtained.

2. On farms where red clover stands are being lost, plant a mixture of legumes rather than red clover alone. Alsike clover may be added to the mixture under almost any soil condition, being most favorable with poor drainage. Alfalfa may be added where the soil is well drained both on the surface and internally, and has been limed adequately. Ladino clover will give some additional production under most soil conditions, but may increase hay curing problems. Where grazing is to be practiced, Ladino will be more valuable.

3. Lime adequately and fertilize liberally, especially with phosphorous and potash.

4. Remove small grain straw soon after harvest. Mow the stubble and new growth either immediately after harvest or by early August. If the growth is slow during the summer, mowing might best be delayed until the latter part of August. If the stand is clipped soon after small grain harvest and there is a heavy growth following this clipping, it may be necessary to mow the stand again 4 to 6 weeks before the average date of the first killing frost in the fall. Grazing may be used to replace clipping. In all cases, removal of clippings appears desirable.

Soybeans

Soybean varieties were compared for grain yield in a test conducted at College Park by crop specialists. Yields in bushels per acre were well above average as is shown by the following table:

Patoka	38.1
Illini	33.9

Ito San	33.6
Chief	33.1
Kingwa	30.7 (black)
Lincoln	30.6
Scioto	27.9
Manchu	27.3
Mingo	25.4
Wilson 5	18.1 (black)
Aoda	18.1
Earlyana	16.6

RENOVATION

Agronomy department workers have been comparing shallow plowing to disking as a method of changing permanent pasture sods to taller-growing grass and legume mixtures. This comparison has been carried on both with spring and summer preparation of the land. Thus far shallow plowing has been more effective in killing the established sod than has disking. Disking of established sods during the summer has been more effective than disking during the spring. The workers have found that orchard grass in combination with legumes has resulted in better stands than were obtained from

timothy, Lincoln brome grass or Kentucky 31 fescue. The establishment of broadleaf birdsfoot trefoil stands has compared favorably with Kenland red clover and Atlantic alfalfa. However, the agronomists found that the trefoil stands have not remained as productive as would be expected. A higher percentage of the seeded plants became established on the areas which had been plowed than on the areas which had been disked. This work is being continued to study the effect of variations in seasonal weather conditions on seedling establishment under the different treatments.

HYBRID CORN

The Agronomy Department scientists continued tests of dent and sweet corn hybrids during this year. Detailed results of the many hybrids tested are available in the publications "Performance of Hybrid Corn in 1943" and

"Sweet Corn Field Trials of 1948."

The dent corn tests were conducted at 10 locations in the State, while the sweet corn tests were conducted only on the Plant Research Farm near College Park.

SMALL GRAINS

Wheat

Agronomy specialists continued tests of various wheat varieties at College Park. Yields were satisfactory although leaf rust was rather severe. All varieties widely used in Maryland such as Thorne, Leapland, Nittany, and Mammoth Red showed much rust. Least affected were three experimental rust-resistant selections from the USDA; namely, Y2375, Y2381, and Y2652.

These three were definitely in a class by themselves not only for freedom from rust, but also for productivity. Other characteristics appeared satisfactory. Yields per acre were as follows: Y2652, 42.5; Y2381, 40.1; and Y2375, 38.7. Yields for other varieties were significantly lower and, for the most part, closely grouped. Recommended varieties yielded as follows: Thorne, 33.6; Leapland, 35.7; Nittany,

30.6; and Mammoth Red, 31.8. In line with past experience the bearded varieties were less productive than Thorne and Leapland. Nudel, a bearded strain from the Delaware station, gave promise of being better than either of these two.

Barley

Barley tests were conducted at College Park with the following results in bushels per acre:

Wong	50.5
Nat. Sel. C. I. 6625	48.3
Davidson	47.9
Tennessee Winter	43.1
Smooth Awn	42.9
Kentucky No. 1	40.5
Marnobarb	39.2
Sunrise	34.6

SOIL MOISTURES

Soil scientists determined the amount of moisture in soils covered by trees, corn, hay, grain (with grass seeding) and pasture. These determinations were made at the Plant Research Farm near College Park on six adjoining watersheds during the past 7 years, and show that the average soil moisture was lowest under pasture vegetation and became successively higher for

The agronomists found that Wong continues to be the outstanding variety for this area. It has, on the basis of a 4-year average, been well ahead of its closest competitor. Like all popular and productive varieties, it is quite susceptible to loose smut. Clean seed stocks enhance its performance very markedly. A program of multiplying seed from hot water treated stocks is necessary.

Of the varieties included in the test, Tennessee Winter has shown the most resistance to loose smut. Unfortunately it has weak straw, barbed awns, and is only fairly productive.

grain, hay, corn, and tree cover.

Under Maryland conditions it would thus seem that the taller the crop cover the better would be conservation of soil moisture through reduction in surface evaporation. Up-and down-the-slope tillage increased water run-off and on the average decreased slightly the soil moisture in August and September as compared to contour tillage.

TOBACCO

A diverse research program related to tobacco has been initiated, following the purchase late in 1947 of a typical Southern Maryland tobacco farm by the University. Most of the studies involve the efforts of specialists from the U. S. Plant Industry Station in cooperation with scientists from the Departments of Agricultural Engineering, Agronomy, Botany, and Entomology of the University.

Studies of the fertilizer needs of tobacco include differential treatments with nitrogen, phosphorus, potassium, calcium, magnesium, sodium and sulphur. The most economical placement

of fertilizer at several levels of treatment is likewise included in the nutritional studies.

A project on topping and suckering practices is correlated with variables in plant spacing and fertilization in order to evaluate the integrated effect of these cultural practices on each other.

Comparisons of several grasses and legumes as winter cover crops for continuous tobacco culture are being made, while in a 3-year rotation, tobacco will be followed by various combinations of soil-improving crops.



Sow and Litter of $\frac{5}{8}$ Landrace and $\frac{3}{8}$ Berkshire.

Animal Husbandry

THE $\frac{3}{8}$ BERKSHIRE- $\frac{5}{8}$ DANISH LANDRACE LINE OF SWINE

THIS line being developed in co-operation with the USDA and Blakeford Farms, Inc., performed satisfactorily during the past year except in the matter of litter size. In a total of 47 litters farrowed, an average of 7.7 pigs per litter were born alive and 6.7 were weaned with an average weaning weight of 31 pounds per pig. Slaughter tests indicated the production of a desirable carcass. No new genetic material was introduced into the herd. Additional boars and gilts were sold to farmers and action was taken to establish new herds of the line.

Curing Pork

In studies of factors influencing the production of cured pork products

several characteristics affecting quality and palatability have been determined. The experiment station scientists are cooperating with workers at the USDA, Beltsville Center. They are looking for a standard salt concentration which will always give satisfactory cure.

A study is being made to determine the concentration and amount of curing solution necessary to produce a high quality ham by the use of arterial injections. Then when the right concentration and amount of curing solution is found it is hoped to develop a method of stitch pumping or regional injection that will give the same high quality hams. Salt concentration and moisture studies are being conducted to determine the most satisfactory

method for the farmer to use in order that he can always produce a high quality, good keeping ham. It is planned to run palatability tests on these hams after certain stated periods of storage time to determine keeping qualities. This would mean a considerable saving to Maryland farmers. Many of our farmers have reported a 25 percent loss in hams due to an improper curing in addition to shrinkage losses.

Breeding Beef Cattle

Cooperation has been established with three herd owners in order to study the record of performance of animals within these herds. Birth, weaning and other records are being kept. Future selection on the basis of efficiency of production is anticipated.

Twenty-four calves were used in the initial phase of a study attempting to develop a suitable technique for an earlier elimination of maternal influences in the testing of calves, as the rate and economy of gain in calves is influenced for a rather long time after weaning by the amount of milk the dam gives the calf. Twelve calves were weaned at 90 days of age and fed individually while 12 were allowed to stay with their dams until 6 months of age. The early-weaned calves grew satisfactorily.

A study of the possibility of herd evaluation on the basis of appearance of individuals similar to that now used in dairy cattle was initiated through the cooperation of owners of beef herds in the State. Daughter-dam and other comparisons of related individuals are being made in order to study the inheritance of body form.

Development of Rams

A study of the age of appearance of the various cell types which are responsible for the production of spermatozoa in rams of the Southdown and Hampshire breeds of sheep was initiated. Sixteen rams were castrated and the tissue prepared for sectioning.

Sheep Disease

In cooperation with the department of Dairy Husbandry and the Livestock Sanitary Service, the animal husbandmen have been investigating the influences of ration on ketosis (pregnancy disease) in sheep. By altering rations they were able to induce a very low blood sugar concentration similar to that observed in pregnancy disease but the symptoms typical of this condition were not reproduced. The work is going to be continued on a larger scale during the next year.

Animal Pathology

VETERINARIANS in the Animal Pathology Department have been working out a control program against fowl cholera. Tests have shown that combined vaccination and sulfanomid treatment gives slightly greater resistance than sulfanomid treatment alone. The treatment was less effective in naturally infected flocks which had the disease chronically than it was where the disease was acute.

Sulfathiazole was quite effective in reducing losses from fowl cholera when added to the mash. It was used in levels of 0.5 percent and 2.0 percent of the feed.

Tests have shown that chloroxyquinoline does not compare favorably with iodochloroxyquinoline against natural Blackhead infection. Continued field tests with vioform have confirmed its prophylactic action against the disease. Chloroxyquinoline did not seriously affect growth and feed utilization when incorporated in the feed of cage birds in the ration of 1 percent. In field tests, however, the drug has appeared more toxic.

Vaccines against Newcastle disease have already been accepted by Maryland poultrymen. The injection of these vaccines has only a slight effect on egg

production. The immunization is adequate to carry birds through the broiler period, which is 12 to 16 weeks. These vaccines are continually under study in the virus laboratory of this department. Field tests with this immunization method have been made. Losses from Newcastle have been cut to a low level in both pullet and broiler flocks. There was only a slight loss from the infection of the vaccine and slowing up of growth was only slight. Studies are also being made of the effects of Newcastle serum in relationship to poliomyelitis in experimental animals.

In work with Bang's disease the animal pathologists have vaccinated 2,750 calves since 1940. They are comparing different methods of injecting the vaccine and also investigating adult vaccination.

Other studies in this department include work on anaplasmosis, a disease of cattle; the role of the acid-base balance as a possible cause of milk fever and acetonemia in dairy cattle; a project on bovine mastitis; the probable presence of a Rh-like factor in horses as a cause of loss of foals; and the development of a vaccine for use in infectious anemia, or swamp fever, of horses.

Botany

CONTINUING studies of disease resistance in potatoes to wilt, late blight and virus diseases have been carried on over the past few years by plant pathologists in the Botany Department. In this work many varieties and seedlings have been tested and compared. These tests are being made in several different parts of Maryland.

On the Eastern Shore the most significant benefit from the investigations has been the substitution of Katahdin for much of the Irish Cobbler. For late planting, the varieties Pontiac and Sebago have been substituted for Dakota Red.

In Garrett County, Potomac and Marygold have been introduced.

It has been found that spraying with a combination of fungicide and insecticide was superior to using an insecticide alone regardless of the resistance to late blight.

Hormone and other chemical treatments to break the rest period in potatoes have been tested. If these treatments can be worked out it will enable potato growers to use potatoes from early crops as seed for the late crops the same season.

The pathologists have also shown the benefits of spraying tomatoes and cantaloupes with organic fungicides to control several fruit and foliage diseases.

Soil and Seed Treatments

In another study the plant pathologists are investigating different chemical soil treatments for control of certain diseases. There is hope of controlling sweet potato pox and various nematode diseases by this method.

Chemical treatment of seed sweet potatoes and of sprouts has reduced losses from scurf and black rot. A method combining selection of seed and chemical treatment has helped control sweet potato stem rot. Treatment of pea seed and pepper seed has controlled certain diseases of these crops. The effect of seed treatment of the population of bacteria and fungi in the soil has been studied.

Other studies in this department have dealt with the development of identifying and control procedures of plant virus diseases in Maryland.

Strawberry Breeding.

Approximately 50,000 strawberry seedlings are tested for resistance to the red stele disease each year in the greenhouse and about 5,000 are regularly transplanted to the field in an effort to select hybrids with high resistance to red stele and other diseases. High quality is also demanded of these resistant selections. Two varieties which

Temple left and Blakemore right in Red Stele infested soil.





A sample of Temple strawberries.

have proved themselves in this work. Temple and Fairland, are already being used by growers both in Maryland and in other states. Selections of new seedlings which have proved promising have been distributed to Maryland growers.

Physiology and Genetics of Plants

In plant physiology, there are several subjects that have been or are receiving consideration. These include: a. the nature of "browning" of injured kernels of sweet corn; b. ethylene production of various fruits and vegetables; c. the use of supplemental copper fertilizers for various Maryland crops; and, d. the relationship between

mineral content of leaves and the yield of the plants. Research is currently being initiated on the role of boron in flowering and fruiting of plants, limiting factors in plant growth, and fundamental studies of transpiration in xerophytes and mesophytes.

The cytogeneticists in the department are working on the development of improved pepper varieties. A number of inbred lines of peppers have been obtained from doubling the chromosome number of haploid plants by chemical treatment. The doubled haploid peppers will shortly be field tested to select commercially desirable inbred lines as well as parental stocks for developing new hybrids. Twin and triplet seedlings have been found to be a fruitful source of new haploids and several fundamental studies are in progress on these unusual and valuable types. The new methods employed in pepper breeding, it is believed, will serve as a basis for developing improved types of other plants. Additionally conventional breeding techniques are being employed to developing improved pepper varieties for Maryland. Research is also in progress on fundamental botanical problems in gladiolus, crocus and lilies.

Another study involves the occurrence, distribution, and economic importance of the native plants of Maryland.

Dairy

DAIRY processing specialists have been trying to discover some of the fundamental factors involving high temperature treatment of dairy products. These studies may lead to improved techniques in the prevention of certain flavor and color defects. It was found, for instance, that heating momentarily to 95° C., or heating at 80° C. for 1 hour, resulted in slight ammonia production. Use of higher temperatures, or greater time periods caused an increase in the production of ammonia. The scientists have attempted to determine critical temperatures for ammonia liberation. They are also searching for the source of this ammonia.

Acetonemia

Most dairymen are familiar with ketosis (often called acetonemia), which is an ailment of high producing cows occurring within a few days or a few weeks after calving. The cow usually goes "off feed," becomes lethargic, declines in milk production, and loses weight rapidly. Frequently cows exhibit incoordination and stiffness. The main difficulty is a lack of enough animal starch in the liver and other tissues and too little sugar in the blood.

To determine the cause of ketosis, extensive studies are being conducted on cows suffering with this ailment. Also, most of the cows in the Experiment Station herd are being used in an attempt to reproduce the condition experimentally. Considerable success has been achieved in this direction though much remains to be done.

Cows that have ketosis are being obtained from dairymen in Maryland. These cows are being slaughtered, and a very complete chemical and histological study is being made on the blood and on the various organs of the body. The objective is to determine the cause of the condition and also to find out why some of the animals do not recover. With this information it should be possible to do a more effective job in preventing the condition and in treating those cows which do develop it. The best treatment known to date is the intravenous injection of dextrose followed by the feeding of molasses. The only preventive measures which have been of help are more liberal feeding following calving supplemented by the feeding of molasses. Feeding molasses or sugar before calving has not been helpful in the prevention of this condition. The Dairy Department would like to solicit the help of dairymen in obtaining cows with ketosis for experimental work. It will be appreciated if anyone who has a cow with ketosis that might be purchased would call J. C. Shaw at the University of Maryland. The telephone number is Warfield 3800, Washington exchange.

Vitamin A

Other experiments have shown that soybeans, both roasted and raw, when fed liberally increased the vitamin A requirements of dairy cattle. Studies are being conducted to determine why soybeans tend to destroy vitamin A. When cattle are on pasture or are receiving silage or a good quality legume hay, no difficulty will be encountered from the feeding of large amounts of soybeans.

Some experiment stations have reported that alfalfa hay, when fed alone, is lacking in some feed factor needed for milk production and that this factor is present in grains. Studies at Maryland indicate that there is no deficiency in alfalfa hay other than the inability of the cow to eat and digest the necessary amount of energy to provide for good milk production. This work also includes studies on chemical changes in digestion in the rumen and the relation of such changes to milk production.

In another study, preliminary work indicated that milk secretion can be increased by maintaining the proper ratio between fat intake and the intake of other nutrients. A detailed study of this relationship is now under way.

Contrary to the general belief, it has been found that dried distillers' grains

are an excellent ingredient for dairy cattle during the dry and freshening period. They are also a good source of energy for cows following calving. Because of their high energy they are helpful in maintaining body weight during the first few weeks following calving when the energy demands for milk production are usually greater than the amount the cow can eat.

Other Studies

Other projects which the dairy scientists are working on are a study of the chemical changes in milk fat related to the flavor of milk; the fat metabolism of the mammary gland; factors that affect the availability of nutrients in feeds and their influence upon blood composition and milk secretion, and the effect of feeding high energy diets during the freshening period.

Entomology

RESearch workers in the Entomology Department of the experiment station have been studying the control of pea aphids. Although the cash value of their treatment is difficult to calculate, they have already shown that there is a decided benefit in the use of insecticides to control this pest.

Considerable effort has been spent in the development of machinery for use with liquefied gas insecticide aerosols. This method of spraying is being tested for control of the corn borer, flea beetles, leaf hoppers, potato bugs, as well as pea, bean, cabbage and spinach pests.

Study DDT

In their insecticide work the insect specialists have tested various commercial DDT emulsions for their effects on plants as well as the control of mealy bugs on certain plants and the control of scale in orchards. They are continuing to test new insecticides on ants in greenhouses.

Chlordane has proved to be the best insecticide for ants in greenhouses and is also very good for control of Collembola.

Studies on the biology and control of the European corn borer under Maryland conditions have continued through this year. The work was concerned primarily with the observation, seasonal history, the intensity of infestation in various parts of the State, the distribution of parasites, the determination of the extent of parasitism over the State, and the development of machinery for applying insecticides.

The establishment of parasites has been found satisfactory. Surveys for 1948 show an average of 40 percent parasitism by one species of overwintering larvae.

Other Tests

Other experiments were conducted on the control of corn ear worm and tobacco aphids in the field, and aphids, collembola, and flea beetles in the plant beds. Control of all but the aphid has been accomplished. The latter has not been possible primarily because machinery for applying insecticide after the plants cover the row has not been available.

Still other studies involve the Japanese Beetle, the Codling Moth, nursery insects, and the insect pests of commercial floriculture.

Horticulture

HORTICULTURISTS at the experiment station have been studying factors which influence yield and quality in the production and processing of such vegetables as tomatoes, corn, and snap beans. Their work showing differences between varieties of tomatoes for tomato juice has helped processors to choose better suited varieties. They have also determined which variety of corn was best suited for processing from the standpoint of yield, cut off, and quality. The possibility of removing corn borer larvae from ears of corn before kernels are cut off has also been studied. Work with snap beans is leading to a more efficient handling in canning. All of these things can mean greater profits to farmers through more efficient usage.

In testing large numbers of varieties of processing vegetables and fruits the scientists have been able to furnish a basis for determining quality losses. Their encouragement of the use of ascorbic acid for frozen peaches opens greater marketing life and adds such excellent varieties as Sunhigh to the freezing peaches. In comparing one variety with another, the food technologists have developed a method for measuring quality in sweet corn. This will be invaluable both to the processor and the general public.

Measuring Foods

Food scientists have been working on methods of measuring such things as the nutritional values, palatability, and attractiveness of fresh and processed vegetables. They have found color measuring methods which work very well in judging asparagus, peas, beans and tomatoes. Pressure instruments

which tell the quality of asparagus have been found successful for practical use. A machine called the succulometer has been recommended for measuring the succulence of sweet corn. The food technologists have also made progress on a pressure tester for beans, a firmness tester for tomatoes, and a miniature tenderometer (which tests tenderness) for lima beans and peas.

Color Methods

Color methods for testing quality of asparagus, peas, beans, and tomatoes have proved so successful and practical that an ordinary analyst can turn out from 40 to 60 a day right in the field.

In addition to these tests, basic botanical studies are being made on the quality of fresh vegetables. Various methods of harvesting, preparation for market, and storage are being compared.

Seeding Rates For Peas

In a series of experiments on vegetable crop management the horticulturists have found that it would be economically sound to use up to 5 bushels of pea seed per acre. In the same test it was found that the Alaska variety out yielded the Superlaska variety in 1948. If you calculate it at \$6.20 per bushel for seed and \$100 per ton for shelled peas the increase in net return from the 5-bushel seeding as compared with 4 bushels of seed was \$9.25 per acre. The workers also found that aerosol applications of dinitro weed killers decreased net returns by at least \$14.80 per acre.

Research workers in the Horticulture Department are making regional

studies of several of the vegetable crops grown in Maryland. They are testing many varieties as a guide to growers in their selections. They base results both on yield and quality.

As a result of some of these studies, information has been released to canners and vegetable growers on tomatoes, snap beans, peas, lettuce, and a new vegetable in the State, tampola.

In studies on strawberry plants the scientists have made several discoveries relating to the Temple variety. They find that reducing the plant stand of this variety during the second growing season increases the yields during the second fruiting season. This will be a satisfactory practice for commercial production if the labor involved doesn't offset gains obtained.

Potassium Deficiency

Fruit tree specialists in the Horticulture Department have helped solve the potassium deficiency problem for young peach trees. Diagnosis of min-

eral levels and deficiencies for several materials have become so exact that these problems can be largely avoided. Bearing apple orchards in need of magnesium are improved with recommended applications of dolomitic limestone.

In studies of fruit varieties, recent plantings have been made of peaches, apples, black and red raspberries and strawberries. Approximately 2,500 black raspberry and 2,000 red raspberry seedlings are now under observation. Two thousand strawberry seedlings are also being tested.

Among other projects in the Horticulture Department are studies on the mineral requirements of certain ornamental plants; propagation of woody plants; prepackaging of cut flowers; factors affecting maturity, shipping and storage quality of fruits; grading raw products; the value of organic matter in the production of vegetable crops; and tomato breeding for greater resistance to cracking and late blight.

Poultry

WORKERS in the Poultry Department at the Experiment Station have made progress in determining the decrease in temperature of egg yolks in relation to the length of time that eggs are subjected to below freezing temperatures. They have demonstrated that many hatching eggs which are now rejected by hatchery operators because of being severely chilled may be incubated with satisfactory results. They are continuing this study in an effort to determine how low the internal temperature can go without loss of life. The key to this study will be finding out when an egg changes from the cold-blooded to the warm-blooded state.

The mineral-oil treatment of shell eggs is of particular importance in storage, since these eggs usually retain quality to a much greater degree than untreated eggs. There was, however, a lack of information concerning the proper temperature of the oil, and the length of time of shell treatment. Oiling of eggs slowed up loss of water and improved the candling appearance, especially after the fourth month of storage.

At temperatures ranging from 90° to 120° F. the scientists found that 80 seconds was the best treatment time. Over 160° F. best results were obtained with shorter treatments.

Heating eggs to 140° F. for 15 minutes provided the most outstanding results of the experiment. The workers concluded that this "thermo stabilization" improved the albumen condition of day old eggs and that this condition can be maintained for a seven-month storage period.

Drugs

During the past few years numerous drugs have become available which show powerful hormone-like action in controlling body processes. Scientists have found that the rate of metabolism and putting on of body fat can be controlled by some of these products. When they control the rate of metabolism of market birds and then influence the rate of feed utilization they have been able to get more economical broiler production.

In a study of various levels of the drug, stilbestrol, plus thiouracil in finished broilers for market results were encouraging. The researchers found that although the addition of compounds having female sex hormone activity has proved to be effective in producing better quality market males, there was no improvement in efficiency of gain. A more practical way of improving quality was that of using the drugs thiouracil and thyroprotein. By manipulation of the amounts of these drugs the workers were able to get birds to grow at faster rates that had better market qualities.

Poultry Physiology

As a part of the studies on the physiology of reproduction in poultry, poultry specialists have investigated the effects of increased and decreased amounts of the hormone, thyroxin, upon poultry. The thyroid gland is known to play a very important part in the relationship in many body processes. There was reason to believe that the level of thyroidal activity would have a considerable influence on the reproductive capacity of a female fowl.

The hatcheryman is always faced with the problem of securing a good hatchability, as this is a factor for determining his profit or loss.

The research workers found that feeding to either increase or decrease this hormone did not affect either hatchability or egg production. There were depressing effects of feeding too much thioracil, a drug which decreases the animal's supply of thyroxin.

Another part of the study of the physiology of reproduction dealt with the differences in thyroid gland activity as related to strain differences in growth, feed utilization, and feathering. It has been found that birds with the highest thyroidal activity were in strains which naturally grew more rapidly and the degree of relation between thyroidal activity and the rate of growth was quite marked. In the tests, although the rapid-growing strains were not stimulated to grow faster, slow-growing strains were definitely stimulated by feeding thyroprotein. This increase in thyroid activity also brings about a more rapid feathering.

The information that these scientists are gaining on such fundamental things as this relation between thyroidal activity, rate of growth, and feed efficiency will eventually result in the more economical production of poultry meat.

Further studies along this line are planned in which the research workers will feed some of the "high energy" rations. They'll examine the effects of these rations on basal metabolism and how the administration of thyroprotein to these rations effects growth and metabolic activity.

Poultry nutrition people have been investigating all sorts of factors in the diets of laying pullets and broilers.

They have found, for instance, that the addition of small amounts of a vitamin called folic acid had an effect on hatchability of eggs. From 26-34 micrograms per 100 grams of diet are required for normal hatchability, while 26 micrograms of folic acid per 100 grams of diet are adequate for normal production and fertility of eggs.

The rate-of-growth, degree of abnormal feather coloring, and incidence of faulty feather structure in chicks can be influenced greatly by the amount of folic acid in hen diets.

In other experiments it was demonstrated that the source of fiber in chick diets was important. Rations containing 4 percent from wheat bran, alfalfa meal, oats, or corn cobs significantly depressed growth, while a ration containing 4 percent cellophane did not.

Superior Strains

In their poultry breeding work the specialists have been trying to develop a superior egg and meat producing strain. About 90 percent of the broilers produced in Maryland are from crosses of Barred Plymouth Rock males and New Hampshire females. The rest are purebred New Hampshire females. The poultrymen should like to develop strains of high-laying, rapid-growing, fast-feathering, superior breast, fleshed strain of Columbian feathered females to mate to similar kinds of New Hampshire males. This would eliminate the cost of "sexing" chicks at hatching time.

It is estimated that this sex-linking inheritance of "silver" should save several thousand dollars each year for Maryland poultrymen. In addition the light over color of the progeny would save money in dressing broilers.

Sociology

RESearch workers in rural sociology have been studying the reading interests and preferences, population characteristics, and levels of living of the rural people in Prince George's County so they can provide a basis for library planning. These are pilot experiments for similar studies in other counties with the same problem.

Neighborhood and community information is being used as the basis

for locating main and branch libraries as well as stops for the county bookmobile. It was found that after the first year of bookmobile service, 11 percent of the county residents were using the books it carried. This study has attracted national attention because of its usefulness in connection with setting up plans for rural demonstration libraries incident to the pending rural library bill.



Figure 1. Ryegrass cover crop in foreground and rye and vetch in background at the time for late turning. The area on the right has been turned one month.

Soil Conservation Research

Report on cooperative projects between the U. S. Department of Agriculture, Soil Conservation Service, Division of Research and the Maryland Agricultural Experiment Station, College Park, Md., for the year ending June 30, 1949.

SUMMARY OF RESULTS—CONSERVATION PRACTICES

Conservation practices for tobacco land in Southern Maryland

Some outstanding results have been shown in the studies of cultural and management practices on controlling erosion during the tobacco growing season.

Controlled row grade with planting and all cultivation on relatively high ridges has prevented serious erosion and given increased crop yields. In practice the controlled grade ridge

rows have several advantages that affect yield. Excess water is drained off between the rows which reduces the danger of drowning; soil moisture and fertilizer are better utilized; and little handwork is required for weeding. Some surface smoothing is usually required the first time a field is prepared for a control row grade layout.

Much progress has been made in the study of cover crops for land on which several successive crops of tobacco are



Figure 2. Tobacco following tobacco with a winter cover of rye and vetch turned late in the spring.

Figure 3. Tobacco following a heavy growth of rye and vetch turned down late in the spring. This shows the ridge rows shortly after planting. The area in the left foreground had over 6 tons dry weight top growth of rye and vetch turned under.





Figure 4. Two very steep roadbanks along Central Avenue in Anne Arundel County. Left, the unprotected bank causes considerable damage to the highway. Excess dirt washes out onto the road and needs to be removed in some spots, while in other areas deep ditches are washed. Right, the protected roadside bank was planted to kudzu 12 years ago and has given it complete protection.

to be grown. Tobacco grown after mixtures of hairy vetch with wheat, rye, or ryegrass have given very substantial increases in yield, quality and crop value over tobacco grown following the non-legumes used without the vetch. Crop values have been further increased by late season turning down of the mixtures.

The advantage of late turning is that the amount of residues is greatly increased and decomposes more slowly, thus giving added resistance to erosion throughout the crop season. At the same time it improves the physical properties of the soil. (See Figure 3.) The late turning of the rye-vetch mixture in 1948 increased the dry weight of the crop residue by 5 tons.

A good turning date for the wheat-vetch and rye-vetch mixtures is when the wheat or rye is in bloom stage. Ryegrass is slower to mature and has usually been turned down in a somewhat earlier stage of its development. (See Figure 1.)

Plants for controlling roadside erosion

Roadside erosion is not only a serious problem to the highways, but often the concentration of water contributes heavily to erosion and gullies in adjacent fields. The annual maintenance of unprotected roadsides results in heavy expenditure of public funds. *Sericea lespedeza* and kudzu are two leguminous plants that have been tested over a period of years and have proved successful under many situations on roadside cuts. (See Figure 4.) Once established, these plants are strong growers and require a minimum of maintenance. Kudzu is effective on very steep cuts because of its viny growth habits. *Sericea lespedeza* is adapted to gentler slopes and does well under droughty subsoil conditions. Studies show that most Maryland soils need moderate applications of phosphate and potash for adequate growth of these plants.

Nitrates in ridge rows after spring plowing of meadow crops

Alfalfa-bromegrass was plowed under on April 12 and May 27, 1948. Soon after plowing, ridge rows were laid out on a 1 percent grade for the purpose of controlling soil and water losses. The residues were concentrated in the top 6 or 8 inches of the ridge rows. The plots were kept fallow. Although the nitrate nitrogen content of soil was very low throughout the top 5 feet of soil at the time of plowing there was a progressive increase during June, July, and August. September and October showed slight decreases in nitrate nitrogen. The whole nitrate picture for the 0-to 5-foot profile was similar to that of the second foot, although differences were greater in magnitude in the second foot. In general, nitrate accumulations were greater at 2 feet than at any other depths. This may be explained by the excessive rainfall that occurred during the season, and by the layer of fine soil material that was present in the second foot of soil. There was a progressive accumulation of nitrates at the 4-foot depth throughout the season and similar, although less pronounced, increases at the 5-foot depth through September.

The date of plowing the meadow crop under had a pronounced effect on nitrate release. Soils in which the crops were plowed under on April 12 showed more nitrates in June than those plowed on May 27. The greatest accumulation of nitrates for both dates of plowing was reached in August at which time the early plowed soils yielded more nitrates than those plowed later.

Decomposition of plant residues in soil

Plant residues play an important part in good farming practices. They may be used as a source of organic matter and plant nutrients, as a pro-

tective cover against soil erosion and water losses through run-off or evaporation, and as a means of improving soil structure. In order to understand how to utilize the various plant residues to best advantage, an understanding of their rates of decomposition is essential.

The relative rates of decomposition of different plant residues added to soil samples at the rate of 20 tons per acre. Carbon dioxide evolution is used as a measure of decomposition. Mature plant materials covering a wide range in chemical composition and representative of those likely to be encountered in tobacco farming in Maryland were used.

Corncocks and stickweed were the most resistant to decomposition while alfalfa was the most susceptible. Tobacco roots decomposed more slowly than tobacco stalks and stickweed more slowly than ragweed.

Earthworms and soil structure

Aggregates formed from soil materials in the intestinal tract of the earthworm and excreted as casts were found to be highly resistant to the impact of falling water drops. After excretion, the casts showed a large increase in the number of bacteria present and a decrease in water stability.

Winter protection improves soil structure.

Field studies on soil deterioration indicated that much of the damage to the physical quality of clean-cultivated soils occurred during the winter months. Freezing and thawing destroys much of the aggregate structure of soils and produces a condition unfavorable to the growth of crops. Field studies show that this loss of structure can be prevented to a great degree by winter mulching or by thick growing

winter cover crops. In general fall-planted small grain did not give adequate protection.

Winter protection is effective in promoting a rapid intake of water by the

soil. This is associated with increased earthworm activity on the protected soil and a decrease in the amount of slumping that occurred as a result of frost action.

SUMMARY OF RESULTS—HYDROLOGIC STUDIES

By October of 1948 the data on precipitation and run-off on six of the ten watersheds under study at the Plant Research Farm near College Park were summarized, and the effect of certain land-use practices on peak rates and total accumulated run-off was determined. At that time, 9.2 to 8.2 years of records had been collected on these experimental areas.

Description of Areas Investigated and Their Management
Cultivated Rotation Areas. A pair of adjacent watersheds, W-I (8.22 acres) and W-II (7.44 acres), were managed so that the effect of up-and-down-the-slope tillage could be compared with strip cropping on the approximate contour in a corn, wheat and hay rotation.

W-I is not so steep as W-II, but has suffered a greater amount of past erosion. W-I has 19.5 percent of its area covered with a deposit of soil which washed from higher slopes, whereas W-II has 35.8 percent of such areas. The soils on W-I are 32 percent poorly drained and 58 percent imperfectly drained, with only 10 percent well-drained. W-II, in contrast, has 72 percent well drained soils and only 28 percent imperfectly drained. The W-I soil profiles are moderately deep, averaging 27 inches down to the hardpan or slowly permeable layers. Those on W-II range from deep to moderately deep, averaging 34 inches deep with no restriction in downward drainage on the well drained areas.

During the initial comparative period

of 3.2 years (1939-42), both areas were strip cropped, and the run-off from each area was measured. The strips were laid 96 feet wide, and were within 2 percent of the contour of all places. In the next 3-year rotation, (1942-45), W-II was changed to three fields of equal size with tillage up and down the general slopes. The approximate contour strip cropping was continued on W-I unchanged. Run-off measurements for each area were again made. In the third rotation period (1945-48), W-II was again strip cropped, and W-I was changed to three fields of equal size with up-and down-the-slope tillage.

Pastured Areas. In a pasture experiment, two adjacent areas of 3.5 acres each, W-VI and W-VII, were grazed heavily for 2.7 years (1940-43) as regular pastures by horses and cattle, and the run-off from each was measured. Following the initial period (in May 1943), 14 contour pasture furrows, spaced 20 feet apart on the steepest slope, were plowed in on W-VII by making two trips with a two-way, 16-inch bottom plow mounted on a tractor. The first furrow was plowed shallow and the second was deep. When worked down with a single row disk cultivator and seeded, the furrows averaged about 0.6 of a square foot in cross section. A few dams were placed across the furrows where they were not quite on the contour; the location of these dams was determined during a heavy run-off. Each furrow will hold or trap about

0.25 inches of run-off from the area above. The length of the furrows totals slightly over a mile for the 3.5 acres. W-VI remained as before, a regular pasture, during this second comparative period of 5.5 years (1943-48).

W-VII is slightly steeper than W-VI and has a more rolling topography. It has had somewhat more serious erosion in the past and also more deposition. Its soil profile is shallow (18-inch average), and 84 percent of its area is imperfectly or poorly drained, with only 16 percent well drained. W-VI is moderately deep (26-inch average), is 54 percent well drained with the remainder imperfectly drained.

Woodland Areas. W-VIII and W-IX are 0.8 of a mile apart. W-IX (12.05 acres) was covered with a mature stand of mixed hardwoods and Virginia pine on moderately deep (average—22 inches), 78 percent well drained soils. W-VIII is a 2.43 acre area of cut-over woods in which a second growth of hardwoods and pine has been developing during the last 15 or 20 years. The soil profile is moderately deep (averages 23 inches) and all imperfectly drained. W-IX is slightly steeper and has had slightly more erosion than W-VIII. Thirty-four percent of W-IX and 69 percent of W-VIII has had no erosion.

In the latter part of February 1948, a heavy cutting of hardwood and pine was begun on W-IX. Some saw logs were topped out and skidded from the area, but most of them remained where they were felled during the spring and summer of 1948. These operations resulted in a marked reduction in canopy over the area, and the woodland litter was disturbed in many places when the logs were skidded out.

Effect of Change in Land-Use Practices on Total Run-off

Up-and Down-the-Slope Tillage Com-

pared to Strip Cropping. The total summer run-offs (May through October) on the W-II area of well drained soils were doubled and the total winter run-offs (November through April) increased 135 percent because of the change from strip cropping to up-and down-the-slope tillage in a corn, wheat and hay rotation, using W-I as a base. It was expected that a similar comparison could be made between the initial (1939-42) and the third (1945-48) periods for these same watersheds. It was found, however, that the up-and down-the-slope tillage on W-II produced changes or effects which carried over into the third period, and no satisfactory comparison could be made.

W-I was therefore compared with the regular pasture W-VI for an initial period of 5.2 years and then for the third period after W-I had been shifted to up and down tillage. The summer run-offs were increased 138 percent on the W-I imperfectly drained soils, while the winter run-offs increased 115 percent.

Regular Pasture Compared with Contour Pasture Furrows. A 58 percent decrease in the total summer run-off was shown after pasture furrows had been plowed in on the contour on W-VII, an area of shallow, imperfectly drained soils. The winter reduction in total run-off amounted to 59.3 percent. *Effects of Logging on a Mature Woodland.* Although 1 year of results are inadequate to give positive information, there apparently was an increase of 52 percent in one summer run-off on well drained woodland W-IX following heavy logging operations. The base of comparison was the area of cut-over woods with a second growth coming on, W-VIII, on imperfectly drained soils. The 6-months' winter run-off, which included only 2 months of reduction in forest canopy and dis-

turbance of woodland litter, showed a 32 percent decrease on W-IX. Computation of the 2 months' period separately showed a 37 percent reduction in run-off. Hardwoods without leaves, plus a poor litter during the winter period of 1947-48 on W-VIII may have produced more run-off than gentle rains falling directly on a good litter in the early stages of the logging operations on W-IX.

Effect of Change in Land-Use Practices on Peak Rates of Run-off

It should be remembered that the magnitude of peak rates of run-off determines the necessary size of terrace and diversion cross sections and the areas of waterways, terrace outlets, culverts, bridges, pond spillways and other drainage structures. The lower the peak rates to be expected from a drainage area, the smaller and therefore less costly it is to build and maintain structures handling run-off from the area. Reduced peaks may also mean less rilling or gullyng and sheet erosion on cultivated and other lands.

Up and Down Tillage Compared with Strip Cropping or Pasture. W-II, with a corn, wheat and hay rotation on well drained soils, showed an increase of 60 percent in peak rates of run-off that are equaled or exceeded once in 2 years, when shifted from strip cropping to up and down tillage. For the less frequent but greater 10-year peaks an increase of 120 percent is indicated. For the same reason that total run-offs were affected by carry-over effects on W-II from the second to third periods, peak rates could not be compared satisfactorily for W-I and W-II in the third period. Consequently, the W-I peak rates were related to those on the regular pasture W-VI, and the 2-year rates were found to be increased 71 percent

by up and down tillage on the W-I, imperfectly drained soils. The 10-year rates were increased about the same. It would appear that there is less change in the peak rates for the higher frequencies on tight soils due to change in practices than there is on well drained soils.

Pasture Furrows Compared to Regular Pasture. There was a 37 percent reduction in peak rates for 2-year frequencies, and 55 percent in 10-year rates, because of placing contour pasture furrows on the W-VII pasture, which has a shallow, relatively tight soil profile. The greater reduction in the 10-year rates might indicate that the furrows have a distributing effect which spreads water over the area in shallower depths when the furrows overflow in contrast to the concentrations that are known to occur during the greater storms on the natural pasture W-VI.

Relative Silt Losses from Strip Cropping and Up-and Down-the-Slope Tillage

In July 1945, silt samples were obtained during two complete run-off periods on W-I and W-II. From these, it was possible to construct a siltograph of the instantaneous rates of silt loss throughout the storms and to sum up the total loss for each storm for each watershed. The highest rates of soil loss on W-I, strip cropping on tight soils, amounted to only 0.081 and 0.089 pounds per cubic foot of run-off for the July 17 and 22 storms. On well drained W-II, cultivated up and down the slope, the peak rates of silt loss were 0.46 and 0.57 pounds per cubic foot, 5.6 to 6.4 times greater. Total losses on W-I for the two storms summed up to about 0.92 of a ton per acre on the corn acreage whereas they totaled 3.44 tons per acre on W-II, or almost 4 times greater.

SUMMARY

Contour strip cropping and contour pasture furrows reduce the total run-off and the peak rates of run-off. After land is contour tilled, it takes time for it to recover from the effects of up-and down-the-slope tillage. Heavy logging in woodlands increases surface run-off.

When you enable more rain water to infiltrate into the soil profile by reducing run-off, the storage of moisture in the soil increases and is available for plant use in dryer periods of little or no rainfall.

If there is less run-off, there is less soil movement or displacement and less soil is permanently lost from the area, along with plant nutrients and organic matter. Minimum flow in springs, wells and streams is increased.

If peak rates are reduced, it costs less to build and maintain drainage structures. Less gullying and sheet erosion mean less deterioration of our agricultural land resources and less silting of our stream channels, bottom lands, roadways and harbors.

Publications

BULLETINS

Number	Title	Author
A48	Migratory Bee Culture in Maryland.	G. J. Abrams
A49	Farm Mortgage Trends in Maryland.	P. R. Poffenberger S. H. DeVault W. P. Walker
A50	Agricultural Research . . . 1948—61st Annual Report.	W. B. Kemp
A51	Rural Social Organization in Frederick County.	H. H. Hoffsommer

SCIENTIFIC JOURNAL ARTICLES

Number	Title	Author
A202	A Peculiar Enlargement of the Eyeballs in Chicks Caused by Feeding a High Level of Glycine. <i>Proceedings of the Society for Experimental Biology and Medicine.</i>	A. C. Grosche J. O. Anderson G. M. Briggs
A203	Further Studies with Wheat and Pullet Disease. <i>Poultry Science.</i>	G. D. Quigley
A204	Storage of Vine-Ripened Tomatoes. <i>Proceedings of American Society for Horticultural Science.</i>	L. E. Scott J. E. Hawes
A205	A New Species of Pulvinaria (Homoptera-Coccidae). <i>Proceedings of Entomological Society of Washington.</i>	H. S. McConnell
A206	Some Observations Concerning the Period of Fast-ing Poultry Before Slaughter. <i>Poultry Science.</i>	J. M. Gwin G. W. Newell M. A. Jull
A207	Chick Thyroid Size and Incubation Period as In-fluenced by Thyroxine, Thiouracil, and Thyro-protein. <i>Poultry Science.</i>	M. G. McCartney C. S. Shaffner
A208	Five New Buprestidae from South Texas (Coleop-tera). <i>Annals of the Entomological Society of America.</i>	G. B. Vogt
A209	Soil Moisture Variations as Influenced by Vegeta-tion. <i>Soil Science Society Proceedings 1948.</i>	J. H. Axley R. P. Thomas
A210	Influence of Treatment on Fertility Level and Crop Response of Maryland Soils. <i>Soil Science Society Proceedings 1948.</i>	R. P. Thomas H. B. Winant
A211	The Effect of Earthworms on the Productivity of Agricultural Soil. <i>Journal of Agricultural Research.</i>	Henry Hopp C. S. Slater
A212	The Action of Frost on the Water Stability of Soils. <i>Journal of Agricultural Research.</i>	C. S. Slater Henry Hopp

Number	Title	Author
A213	A Principle for Maintaining Structure in Clean Cultivated Soils. <i>Journal of Agricultural Research.</i>	Henry Hopp C. S. Slater
A214	The Effect of Dissociation in <i>Lactobacillus Lactis</i> Cultures on the Requirement for Vitamin B ₁₂ . <i>Journal of Biological Chemistry.</i>	Mary S. Shorb G. M. Briggs
A215	Transmission of the Milk Streak Virus of Black Raspberry. <i>Phytopathology.</i>	N. L. Horn M. W. Woods
A216	A Thiouracil-Thyropotein Treatment for Fattening Poultry. <i>Poultry Science.</i>	R. E. Moreng C. S. Shaffner
A217	Efficiency of Feed Utilization in Relation to Body Weight and Egg Production. <i>Poultry Science.</i>	B. C. Joshi C. S. Shaffner M. A. Jull
A218	Control of the Red Banded Leaf Roller. <i>Journal of Economic Entomology.</i>	Castillo Graham
A219	Control of the Plum Curculio, the Oriental Fruit Moth and Cat Facing on Peaches. <i>Journal of Economic Entomology.</i>	Castillo Graham
A221	Notes on Cerambycidae from the Lower Rio Grande Valley, Texas (Coleoptera). <i>Pan Pacific Entomologist.</i>	G. B. Vogt
A222	Meeting the Increasing Nematode Problem on the Eastern Shore. <i>Peninsula Horticultural Society Proceedings.</i>	W. F. Jeffers
A223	Three New Cicindelae from South Texas with Collecting Notes on Other Cicindelidae (Coleoptera). <i>Bulletin of the Brooklyn Entomological Society.</i>	G. B. Vogt
A224	Milk Lipase System II. Comparison of Solvent Extraction and Churning Methods for Obtaining Fat from Milk for Free Fatty Acid Measurement. <i>Journal of Dairy Science.</i>	B. C. Johnson I. A. Gould
A225	Milk Lipase System III. Further Studies of the Solvent Extraction Procedure for Obtaining Fat from Milk for Titration. <i>Journal of Dairy Science.</i>	B. C. Johnson I. A. Gould
A226	Results of Spraying Tomatoes for Disease Control in Maryland. <i>Proceedings of the Peninsula Horticultural Society.</i>	C. E. Cox J. E. Moore J. J. Smoot
A227	Mineral Nutrient Deficiency Symptoms of Muscadine Grapes in Sand Culture. <i>Proceedings of the American Society of Horticultural Science.</i>	T. B. Hagler L. E. Scott
A228	Response of Vitamin-Deficient Chicks to the Sex Hormones. <i>Poultry Science.</i>	M. E. Haque R. J. Lillie C. S. Shaffner G. M. Briggs

Number	Title	Author
A230	Objective Methods for Measuring Quality Factors of Raw, Canned and Frozen Asparagus. <i>Proceedings of the American Society for Horticultural Science.</i>	A. Kramer I. Haut L. E. Scott L. E. Ide
A231	A New Root Disease of Pin Oaks Possibly Caused by the Nematode, <i>Hoplolaimus coronatus</i> Cobb. <i>Phytopathology.</i>	R. M. Viggars A. C. Tarjan
A232	Roadside Survey for Spot Anthracnose of Flowering Dogwood in Maryland, Virginia, Delaware and West Virginia. <i>The Plant Disease Reporter.</i>	R. A. Jehle Anna E. Jenkins
A233	Factors Affecting the Growth of Lactobacillus Lactis in the Lld Assay. Using Vitamin B ₁₂ as a Standard. <i>Archives of Bio-Chemistry.</i>	Mary S. Shorb G. M. Briggs
A234	The Nutritional Status of Maryland Orchards in Terms of Mineral Content of Leaves and Occurrence of Deficiency Symptoms. <i>Proceedings of the American Society for Horticultural Science.</i>	A. L. Schrader L. E. Scott C. O. Dunbar
A235	Physiological Changes in Asparagus After Harvest. <i>Proceedings of the American Society for Horticultural Science.</i>	L. E. Scott A. Kramer
A236	The Effect of Storage Upon the Ascorbic Acid Content of Tomatoes Harvested at Different Stages of Maturity. <i>Proceedings of the American Society for Horticultural Science.</i>	L. E. Scott A. Kramer
A237	Thyroid Activity as Related to Strain Differences in Growing Chickens. <i>Poultry Science.</i>	E. W. Glazener C. S. Shaffner M. A. Jull
A238	Chemical Changes During Storage of Dehydrated Stayman Winesap Apples as Influenced by Storage Temperature and Pack Atmosphere. <i>Proceedings of the American Society for Horticultural Science.</i>	A. H. Thompson A. L. Schrader
A239	Asparagus Pressure-Fiber Tester: Objective Methods for Measuring Fibrousness in Raw and Canned Green Asparagus. <i>Food Industries.</i>	A. Kramer I. C. Haut L. E. Scott L. E. Ide
A240	A Rapid Objective Method for Measuring the Color of Raw, Canned and Frozen Asparagus. <i>Food Industries.</i>	A. Kramer R. B. Guyer L. E. Scott L. E. Ide
A241	Measuring Quality of Raw and Canned Snap Beans. <i>Food Packer.</i>	A. Kramer R. B. Guyer
A242	Factors Affecting the Objective and Organoleptic Evaluation of Quality in Sweet Corn. <i>Industrial and Engineering Chemistry.</i>	A. Kramer R. B. Guyer L. E. Ide

Number	Title	Author
A243	The Metabolic Rate and Thyroid State of Chicks from Dams with Altered Metabolism. <i>Endocrinology</i> .	M. G. McCartney C. S. Shaffner
A244	Abnormal Feather Germ Organization with Asymmetrical Expression in a Rhode Island Red Fowl. <i>Journal of Morphology</i> .	Mary Juhn
A245	Feather Growth in Sebright Bantams of Henny, Intermediate and Cocky Plumage. <i>Journal of Experimental Zoology</i> .	Mary Juhn

MISCELLANEOUS PERIODICALS, REPORTS, PROCEEDINGS, ETC.

Number	Title	Author
73	Dairy Cow Has Normal Parturitions Three Weeks Apart. <i>Journal of Heredity</i> .	E. J. Weatherby J. W. Pou
74	Revealing the Quality of Ice Cream by Chemical and Bacteriological Methods. <i>The Ice Cream Field</i> .	I. A. Gould P. B. Larsen R. N. Doetsch F. E. Potter A. Kramer
75	Measuring Quality by Objective Methods. <i>Food Packer</i> .	
76	Production in Marketing of Broilers in Delaware and Eastern Shore of Maryland. <i>Mimeographed Circular</i> .	H. D. Smith P. R. Poffenberger S. H. DeVault
77	Pattern for Development of Air Freight Between the United States and Countries in the Caribbean Area. <i>Mimeographed Circular</i> .	G. R. Cassell R. W. Hoecker
78	Performance of Hybrid Corn in 1948. <i>Plano-graphed Circular</i> .	R. G. Rothgeb
79	The Present Status of Pea Aphid Control. <i>Agricultural Chemicals</i> .	L. P. Ditman
80	Fat Variations in Milk. I. Farm Factors. <i>Milk Plant Monthly</i> .	I. A. Gould R. E. Stout
81	Fat Variations in Milk. II. Dairy Plant Factors. <i>Milk Plant Monthly</i> .	I. A. Gould R. E. Stout
82	The Importance of Blossom Blight of Peach. <i>Transactions of the Peninsula Horticultural Society</i> .	L. O. Weaver
83	The Apple Scab Control Program in 1948 and 1949. <i>Transactions of the Peninsula Horticultural Society</i> .	L. O. Weaver
84	Broiler Processing and Marketing in the Del-Mar-Va. Area. <i>Mimeographed Circular</i> .	H. D. Smith P. R. Poffenberger S. H. DeVault

Number	Title	Author
85	Sweet Corn Field Trials. <i>Mimeographed Circular.</i>	R. G. Rothgeb
86	What is Wrong with Red Clover? <i>Annual Report of the Maryland Crop Improvement Association.</i>	A. O. Kuhn
87	When Should Legumes be Seeded? <i>Annual Report of the Maryland Crop Improvement Association.</i>	C. H. Liden
88	The Effect of Storage Upon the Ascorbic Acid Content, Fibrousness and Color of Asparagus. <i>Ice and Refrigeration.</i>	L. E. Scott A. Kramer R. B. Guyer
89	Current Studies on the Fertilizer Requirements of Cantaloupes. <i>Proceedings of the Maryland Vegetable Growers Association, Maryland Agricultural Society.</i>	F. C. Stark, Jr.
90	Research Developments at the Maryland Station, Starter Solution and Hormones. <i>Proceedings of the Maryland Cannery Short Course.</i>	F. C. Stark, Jr.

Current Projects

AGRICULTURAL ECONOMICS

A-18-w	Trends in Farm Mortgage Financing in Maryland.
A-18-x	Father-Son Partnership Arrangements in Maryland.
A-18-y	The Economic and Social Status of Rural Negro Families in Maryland.
A-18-aa	Insurance Coverage Carried by Farmers.
A-18-ab	Economics of Soil Conservation in the Harford County Soil Conservation District of Maryland.
A-18-ac	Farming Alternatives in Major Competing Potato Areas.
A-19-h	Status and Improvement Needs of Rural Roads in Maryland.
A-19-i	Improving Farm Building Assessments for Tax Purposes.
A-19-j	Sales Taxes and Their Application to Farmers.
A-19-k	Recent Tax Changes in Maryland and Their Effect on Farmers' Tax Obligations.
A-19-l	Financial Status and Security of Farmers.
A-26-l	Prices Paid by Farmers for Commodities Bought.
A-26-n	Problems in Marketing in the Postwar Period.
A-26-o	Marketing of Hatching Eggs and Broilers on the Del-Mar-Va Peninsula.
A-26-p	Economic Aspects of Marketing Fresh Fruits and Vegetables in Consumer Packages.
A-26-q	Marketing Premium Sweet Corn Direct from Grower to Retailer.
A-26-r	Retail Merchandising Practices and Display Methods.
A-26-s	Experimental Marketing of Local Produce.

- A-26-t Seasonal and Supplementary Supply Sources and Variations in the Major Fluid Milk Sheds of Maryland.
- A-26-u Consumer Evaluation of Objective Measures of Quality in Fruits and Vegetables.
- A-26-v Effect of Methods of Marketing Eggs on Quality During the Summer Months.
- A-26-w Increased Consumption of, and Lower Marketing Costs for Apples and Peaches Through Adoption of Better Distribution Practices.
- A-32-f Farm Tenancy and Leasing Arrangements in Maryland.
- A-32-h The Effect of Drainage Upon Crop Yields, Farming Practices and Land Utilization.

AGRICULTURAL ENGINEERING

- H-46-a Concentrated Sprays. The Development of Liquefied Gas Insecticide Aerosols and Machinery for Their Application. (In cooperation with Entomology)
- R-6 Investigations of Grain Storage on the Farm.
- R-10 Drying Hay with Heated Air.
- R-11-a Field Harvesting of Tobacco.
- R-11-b Handling Tobacco in the Barn.
- R-11-c Mechanization of Tobacco Production.
- R-11-d Tobacco Housing.
- R-11-e Structures and Equipment for Tobacco Stripping.

AGRONOMY

- B-39 Wheat Hybridization and Selection.
- B-41 Barley Hybridization for Smooth Awns.
- B-43 Soybean Production in Maryland.
- B-44 Sweet Corn Seed Production and Breeding.
- B-50 Development of Dent Corn Hybrids Specifically Adapted to the Corn-Growing Areas of Maryland.
- B-52 Effects of Different Short Rotations on Physical, Chemical and Pathological Conditions in the Soil and on Crop Production.

- B-53 Curing of Maryland Tobacco.
- B-54 Date of Seeding Certain Legumes in Maryland.
- B-55 Study of Inheritance of Oil Producing Capacity in American Worm-seed.
- B-56-a Improvement of Red Clover Adapted to Maryland.
- B-56-b Pasture Renovation Studies.
- B-56-c Management of Medium Red Clover Stands After Combined Wheat and Barley.
- B-56-d Alfalfa Strain and Variety Evaluation.
- B-56-e Red Clover Strain and Variety Evaluation.
- B-56-f Survey of Pasture Conditions in Maryland.

- B-56-i Development of Superior Orchard Grass Strains for Use in Maryland.
- B-57 The Improvement, Production and Use of Rye in Maryland.
- B-58 Chemical Weed Control in Field Crops.
- B-58-a Control of Weeds in Corn by the Use of 2,4-D Preparations.
- O-27 Field Studies of the Fertility Requirements and Management of Important Soil Types in Maryland.
- O-28-b A Study of the Formula and Analysis for Late Potatoes.
- O-33 Efficiency of Soil Fertility Management.
- O-43 Hydrologic Studies with Reference to Soil Moisture Conservation, Soil Fertility and Flood Control.
- O-44-a A Study of the Chemical and Physical Changes Produced in a Soil by the Formation of the Organic Colloidal Complex.
- O-45-a Soil Fertility Studies at the University Farms. Influence of Various Fertilizer Ratios.
- O-45-b A Study of the Availability of Phosphate Material.
- O-47 The Available Supplies and Relative Agricultural Values of By-Product Liming Materials of Eastern Maryland.
- O-47-a A Study of the Lime Needs and Reactions in Maryland Soils.
- O-47-b A Study of Neutralization Value of Slag for Maryland Soils.
- O-48 A Study of the Reclassification of Soils and the Adaptation of These Classes to Soil Conservation Work in Maryland.
- O-49 A Study of the Effect of Fertilizer, Boron, Minor Elements on the Stand, Yield and Composition of Alfalfa.

AGRONOMY—SEED INSPECTION

- N-7 Inspection of Seeds Sold Throughout the State.
- N-8 Examination of Samples from Seeds Sold Throughout the State.
- N-9 Examination of Samples Submitted to the Laboratory.

ANIMAL HUSBANDRY

- C-6 Study of the Factors Which Influence the Production of Cured Pork Products of Desirable Quality and Palatability.
- C-8 Swine Breeding Investigations Within the State of Maryland.
- C-14 The Productiveness of Purebred Beef Cattle in Maryland.
- C-14-a Effect of Early Weaning on the Duration of Maternal Influences in Beef Calves.
- C-14-b Type Classification as an Aid in Selection of Beef Breeding Cattle.
- C-15 Influence of Diet on Ketosis in Sheep.
- C-16 Histological Study of the Development of the Testes of the Ram.
- C-17 Effect of New Feeding and Management Practices on Market Classification and Consumer Desirability of Farm Animals and Their Products.

ANIMAL PATHOLOGY

- D-46 Bang's Disease—Calfhood Vaccination.
- D-48 The Formulation of a Control Program Against Fowl Cholera.

- D-50 Anaplasmosis of Cattle.
- D-51 Experiments with Infectious Enterohepatitis (Blackhead) of Turkeys.
- D-52 Field Trials in Immunization Against Newcastle Disease with Inactivated and Modified Virus Vaccines.
- D-53 Role of Disturbances in the Acid-Base Balance in the Parturient Cow and Their Significance in the Cause of Milk Fever and Ketosis. (Acetonemia)
- D-54 A Study of the Infectious Bovine Mastitis, Its Control and Eradication and the Economic Losses Attending.

BOTANY

- F-9 Cytogenetic Studies in the Genera *Ipomoea*, *Gladiolus* and *Tulipa*.
- F-12 The Native Plants of Maryland, Their Occurrence, Distribution and Economic Importance.
- F-15-a Heterosis in Hybrids from Homozygous Pepper Lines Obtained from Haploid Plants.
- J-72 Potato Improvement and Disease Control.
- J-78-a Breeding Strawberries for Resistance to the Red Stele Disease Caused by *Phytophthora fragariae* Hickman.
- J-80-a Disease Resistance in Potatoes with Special Reference to Wilt and Late Blight.
- J-85 The Effect of Hormone and Chemical Treatments on Breaking the Rest Period of Seed Potatoes.
- J-86 Control of Stem Rot of Sweet Potato by Sprout Treatment.
- J-87 Treatments for Control of Seed and Soil-Borne Diseases of Vegetable Crops.
- J-88 Development of Identification and Control Procedures for Plant Virus Diseases in Maryland.
- K-7 Physiological and Biochemical Aspects of Vegetable Storage.

DAIRY HUSBANDRY

- G-27-a The Effect of Certain Feed Stuffs Upon the Vitamin A Requirements of Dairy Cattle.
- G-34 Chemical Changes in Milk Fat as Related to the Flavor of the Milk.
- G-37-a Metabolic Studies on Cows with Ketosis.
- G-37-b Pathological Studies of Cows with Ketosis.
- G-38 The Fat Metabolism of the Mammary Gland.
- G-39 Factors that Affect the Availability of Nutrients in Feeds and Their Influence Upon Blood Composition and Milk Secretion.
- G-40 The Influence of High Temperature Heat Treatments on Certain Physical and Chemical Properties of Milk.
- G-41 The Effect of Feeding High Energy Diets During the Freshening Period.

ENTOMOLOGY

- H-29 Investigations of the Biology and Control of Insects Affecting Canning Crops.
 Sub. 6. The Pea Aphid. Insecticidal Control and Timing Treatments.
 Sub. G. Insecticidal Control of the Mexican Bean Beetle.
- H-35 Nursery Insects.
- H-40 Biology and Control of Tobacco Insects.
 Sub. 1. The Tobacco Horn Worms.
- H-41 Biology and Control of the Japanese Beetle.
- H-43 The Biology and Control of the European Corn Borer under Maryland Conditions.
- H-46-a Concentrated Sprays. The Development of Liquefied Gas Insecticide Aerosols and Machinery for Their Application.
- H-46-b Concentrated Sprays. Combined Insecticidal and Fungicidal Aerosols.
- H-48 The Codling Moth.
- H-50 The Biology and Control of the Pests of Commercial Floriculture.
- H-52 The Effect of Various Formulations of DDT on Plant and Animal Development.
- H-54 A Monographic Study of the Coccid Family Acleridae (order Homoptera).
- H-55-a The Control of Insects Attacking Peach Foliage and Fruit.
- H-55-b Control of the Peach Tree Borer.
- H-56 Patuxent Project on the Effect of Soil Conservation Upon Insect Populations.

HORTICULTURE

- I-26-A Rooting of Ornamental Plants Difficult to Propagate.
- I-58-A A Physiological Study of the Keeping Qualities of Cut Flowers as Influenced by Packaging.
- I-74-A Effect of Environmental Factors and Cultural Practices on the Growth and Flowering of Hydrangeas and Azaleas.
- I-79-A The Mineral Nutrient Requirements of the Azalea.
- I-79-B The Mineral Nutrition of the Hydrangea.
- L-68 Factors Affecting Maturity, Shipping and Storage Quality of Fruits.
- L-72 Relation of Soil Moisture, Age of Plants, Size of Plants, Spacing of Plants and Use of Mineral Nutrients to Flower Differentiation, Fruit Yield and Quality of the Strawberry.
- L-73 Adaptation of Fruit Varieties and New Seedlings to Maryland.
- L-74 Environmental Factors and Cultural Practices in Relation to the Growth and Fruiting Responses of Fruits.
- Q-58-b Grading Raw Products.
- Q-58-d Qualities of Frozen Vegetables and Fruits as Influenced by Methods of Handling of Raw Stock, Processing, Storage and Utilization.
- Q-58-f Methods of Determining and Preserving Quality Including Nutritional Values, Palatability and Attractiveness in Fresh and Processed Vegetables and Avoiding Wastage During the Various Marketing Processes.
- Q-67 The Value of Organic Matter in the Production of Vegetable Crops.

- Q-74 A Study of Regional Adaptation of Certain Vegetable Crops and Varieties in Maryland.
- Q-77 Crop Management Studies with Vegetable Crops.
- Q-79-b The Mineral Levels and Interrelationships of Mineral Nutrients in Fruit Plantings of Maryland.
- Q-80 Basic Physiological Studies on the Quality of Fresh Vegetables as Modified by Various Factors During Harvesting, Preparation for Market and Storage.
- Q-81 Cantaloupe Breeding and Selection with Particular Reference to Quality and Resistance to Defoliation.
- Q-82 Tomato Breeding and Selection with Particular Reference to Greater Resistance to Cracking and to Late Blight.
- Q-83 Influence of Nutrient Intensity and Balance on the Quality and Physiological Defoliation of Cantaloupes.

POULTRY

- M-32-h Hatchability Studies in Poultry.
- M-32-j The Effect of Hypo and Hyperthyroidism Upon Hatchability in Domestic Fowl.
- M-32-k Differences in Thyroid Activity as Related to Strain Differences in Growth, Feed Utilization and Feathering.
- M-33-e Deterioration in Eggs in Relation to Time and Temperature Changes and a Study of Thermostabilizing Processes.
- M-33-f Changes in Grades of Eggs in Carlot Shipments in Relation to Season, Shipping Distance, Temperature, Time and Other Factors.
- M-33-g Various Levels of Stilbestrol Plus Thiouracil in Finishing Broilers for Market.
- M-34-e Medium Sized Strain of Turkeys with Certain Desirable Qualities.
- M-34-f Developing a Superior Egg and Meat Producing Strain of Chickens Having Columbian Plumage Pattern.
- M-35-g The Requirement of the Growing Chick for Newer Members of the Vitamin B Complex.
- M-35-i Amino Acids in Poultry Nutrition.
- M-35-j The Importance of Fiber in Poultry Rations.
- M-36-e The Role of Wheat in Pullet Disease of Chickens.
- M-43-b Determining Feather Genotype Through Hormone Effects in Lieu of Breeding.
- M-44 The Influence of Methods of Dressing and Holding on the Quality of Poultry Meat.

RURAL SOCIOLOGY

- S-1 Community and Population Bases in Planning County Library Services.

SOIL CONSERVATION

(Headquarters: College Park, Md.)

Soil Microbiology—Roy C. Dawson, Ph.D., Project Supervisor

- R-1-2-6 A study of microbial activity in relation to the utilization of plant
MD-R-4 residues for soil and moisture conservation.
No. 1
R-1-2-6 A study of earthworm activity in relation to the formation of water-
MD-R-4 stable soil aggregates.
No. 2

Agricultural Hydrologic Investigations—H. W. Hobbs, M.S., Project Supervisor

- R-2-3-1 A study of the effect of land-use practices on run-off from agricultural
MD-R-2 lands in the location: Northern Coastal Plains (Montgomery & Prince
George's Counties, Maryland).
R-2-4-1 Run-off studies to determine rates and amounts of run-off from small
MD-R-2 agricultural watersheds (Location: Washington County, Maryland).

HEADQUARTERS

Beltsville, Md.

Soil Conservation Practices—C. S. Britt, B.S., Project Supervisor

- R-1-1-2 The development and improvement of soil conservation practices for
(a) tobacco land in Southern Maryland.
MD-R-3
R-1-1-2 The development and improvement of soil conservation practices for
(c) corn land in Maryland.
MD-R-3
R-1-1-6 Field trials to develop and demonstrate practical treatments for the
MD-R-3 stabilization of roadside banks and ditches.

Soil Physics—C. S. Slater, M.S., Project Supervisor, Henry Hopp, Ph.D., Soil Conservationist, E. B. Kinter, B.S., Associate Soil Technologist

- R-1-2 A study of factors that affect physical conditions in soils.
MD-R-1
R-1-2-4 A study of the effects of profile characteristics on water movement in
MD-R-1 soils, for better planning of drainage systems.

Changes in Personnel

Appointments

- G. M. Beal, Professor, Agricultural Economics, March 1, 1949.
John Buric, Instructor, Animal Husbandry, September 1, 1948.
G. F. Combs, Professor, Poultry Husbandry, September 1, 1948.
A. E. Durfee, Professor, Information and Publication, January 1, 1949.
W. W. Green, Professor, Animal Husbandry, August 1, 1948.
J. O. Hall, Jr., Assistant Inspector, Dairy Husbandry, November 1, 1948.
L. E. Hogue, Instructor, Agronomy, June 1, 1949.
R. D. Rappleye, Instructor, Botany, October 1, 1948.
T. E. Ronningen, Assistant Professor, Agronomy, January 1, 1949.
F. G. Warren, Associate Professor, Dairy Husbandry, November 1, 1948.

Resignations

- I. A. Gould, Professor, Dairy Husbandry, February 15, 1949.
R. W. Hoecker, Professor, Agricultural Economics, December 1, 1948.
P. B. Larsen, Assistant Professor, Dairy Husbandry, September 16, 1948.
A. H. Snyder, Professor, Information and Publication, December 31, 1948.
S. P. Stabler, Instructor, Agronomy, October 1, 1948.

Financial Statement-July 1, 1948 to June 30, 1949

FEDERAL FUNDS

	Hatch	Adams	Purnell	Bankhead-Jones	Research Marketing			
					9(b)1-9(b)2	9(b)3		
Balance June 30, 1948	\$.30	\$	\$	\$ 2.84	\$ 5,435.96	\$ 1,220.44		
Appropriations 1948-49	14,999.70	15,000.00	60,000.00	35,300.17	29,936.10	10,885.00		
	\$15,000.00	\$15,000.00	\$60,000.00	\$35,303.01	\$35,372.06	\$12,105.44		
Receipts from sources other than Federal 1948-49								For Agr. Investigations*
State Appropriations for Agricultural Investigations								\$216,311.35
Industrial Grants								13,336.50
Sales and Miscellaneous								67,168.00
								\$296,815.85
Balance brought forward July 1, 1948								92,800.60
Total								\$389,616.45
Expenditures:								
Personal Services	\$ 7,500.00	\$12,507.50	\$53,437.42	\$31,850.67	\$22,733.53	\$ 5,650.08	\$ 176,959.85	
Travel	3,908.70				281.87	327.47	8,330.35	
Transportation			90.31	1.61	171.30	74.04	613.17	
Communication Service	3.75				3.60		935.34	
Rents and Utility Services			25.33	9.68	7.69	24.77	650.57	
Printing and Binding	241.27						1,909.19	
Other Contractual Services			1,171.10		2,616.35	215.77	10,351.04	
Supplies and Materials	3,104.13	1,067.42	2,126.99	2,898.86	4,927.73	3,430.84	83,928.38	
Equipment	108.73	1,425.08	3,128.12	542.19	189.14	932.68	32,033.35	
Land and Structures					2,937.60		3,245.32	
Contributions to Retirement								
	\$14,866.58	\$15,000.00	\$59,979.27	\$35,303.01	\$33,868.81	\$10,655.65	\$318,956.56	
	133.42		20.73		1,503.25	1,449.79	70,659.89	
Balances June 30, 1949								
Totals	\$15,000.00	\$15,000.00	\$60,000.00	\$35,303.01	\$35,372.06	\$12,105.44	\$389,616.45	

* Including Bankhead-Jones Offset Funds.

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